Center Innovation Fund: LaRC CIF

Convergent High-Order Compact WENO Discontinuity Capturing with Positivity Preserving for Unstructured Discontinuous Galerkin Schemes

Completed Technology Project (2017 - 2018)

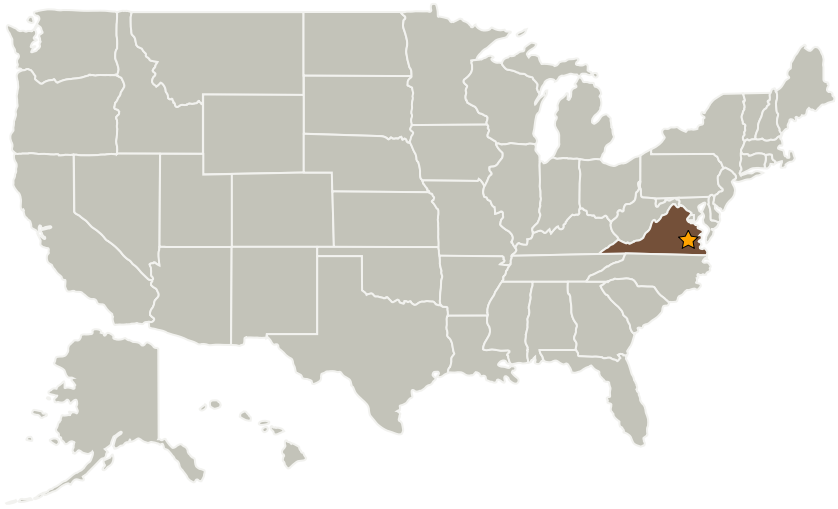
Project Introduction

Recent investigation revealed that the more advanced discontinuity capturing weighted essentially nonoscillatory (WENO) technique, which is of high-order and guarantees the formal order of accuracy in the smooth regions, is nonconvergent (see the image on the right) and a compact convergent WENO for DG has not been developed. Approach: Development of compact convergent WENO for unstructured DG schemes with construction of a set of polynomials that have different lengths than the original polynomials. Innovation: The innovation is in the development and construction of compact high-order WENO scheme that is convergent for energetic discontinuities along with a positivity preserving scheme to guarantee density and pressure values remain within physical range.

Anticipated Benefits

Benefit to EDL system development

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Bordeaux-Sud-Ouest Inria Research Centre	Supporting Organization	Academia	Talence, Outside the United States, France
Brown University	Supporting Organization	Academia	Providence, Rhode Island
University of Massachusetts-Dartmouth	Supporting Organization	Academia	North Dartmouth, Massachusetts

Primary U.S. Work Locations
Virginia

Project Website:

https://www.nasa.gov/directorates/spacetech/innovation_fund/index.html#.VC

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Center Innovation Fund: LaRC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

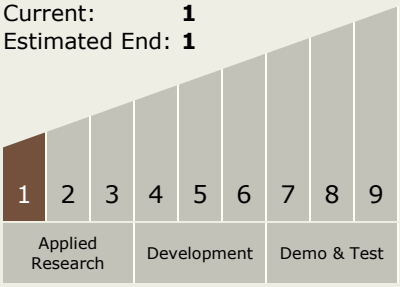
Julie A Williams-byrd

Principal Investigator:

Alireza Mazaheri

Technology Maturity (TRL)

Start: **1**
Current: **1**
Estimated End: **1**



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Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.4 Resource Processing for Production of Manufacturing, Construction, and Energy Storage Feedstock Materials

Target Destination

Earth